

CCD research – Do the facts warrant a moratorium on Australian imports?

Research recently reported in Science, which most of you have probably heard about, identifies an association between Israeli Acute Paralysis Virus (IAPV) and some CCD samples. You may want to read the paper for yourselves if you haven't done so already. Some people think that the paper proves that IAPV causes CCD and that IAPV entered the US in imported Australian bees – but neither has been proven. Others have already made up their minds about the issue of whether Australian bee imports have anything to do with CCD, and whether curtailing Australian imports would reduce the threat of CCD, but for those of you who still have open minds, I'd like to confuse the issue with a few key facts.

First, let me begin by saying that while I am as concerned as anyone about the health of US honey bees, and I want to get answers to what is causing CCD, and what we can do to stop it, I do not personally support a moratorium on Australian bees. Of course you can dismiss my opinion by noting that since the regulations have been changed to allow Australian imports (a change I initially resisted) I have been involved in importing Australian package bees and queens, and it is in my own pecuniary interest to keep Australian imports flowing. You can say that, but I hope you read on, because I want to protect the US

industry as much as anyone, and I have the interests of the whole beekeeping industry at heart. After all, many beekeepers have used Australian packages to successfully restock or strengthen hives that perished or were weakened by CCD or other problems. And I also breed and sell US queens and packages too, so I would not knowingly shoot myself in the foot just to import a few Australian packages or queens.

However, I favor implementing meaningful changes to US laws and regulations to better protect the US beekeeping industry when and if the science demonstrates that imports of foreign bees pose a risk of introducing pathogens or parasites that are not already in the US. If the data demonstrate that there are pests or pathogens present in honey bees from Australia that we do not have here, then changes to current regulations may be warranted. But I believe that our current international treaty obligations require us to look and prove that exporting countries have risks not present in the US if we want to exclude imports. Consequently, immediate, systematic collections and evaluation of honey bee samples from across the country should begin, so that we know the current extent and distribution of various organisms of interest. We also must persuade Congress to fund and USDA to conduct a National Honey Bee Pest and Pathogen Surveillance program to conduct on a regular basis in the future.

Now back to the first issue of whether cessation of Australian imports is warranted under the present circumstances and evidence available today.

First, only one Australian sample from one Australian exporter was analyzed – and that is a very small sample. That non-CCD/IAPV positive sample was of healthy bees straight out of Australia that were hived in Florida. Those Australian bees had IAPV, but they didn't exhibit symptoms of, or die from CCD. In fact some of those Australian bees from the IAPV positive sample that were hived in irradiated equipment went on to establish healthy, productive colonies. So IAPV is unlikely to be acting alone to cause CCD – in fact it may not be causing CCD at all. The authors of the paper admit that much. It could be that CCD is caused by something else, and that CCD colonies are more prone to developing a viral infection that often occurs in healthy colonies without causing symptoms.

Second, obviously IAPV is already widely distributed in this country, regardless where it originated – All of the IAPV positive, CCD samples came from US operations. What will closing the border to Australian imports do to solve the problem – if IAPV is one – now? We know from *Varroa destructor*, *Acarapis woodii* and *Aethina tumida* infestations, that our own beekeeping practices and invasive species tendencies can spread exotic pests and pathogens all over this country (without Australian imports playing any role whatsoever). If the justification for suspending Australian imports is to prevent the spread of IAPV, or

reduce the risk of CCD, then maybe we better stop all interstate bee movement and quarantine affected apiaries immediately? After all we know next to nothing about the prevalence and distribution of IAPV in this country either – but it is surely here and if is behind CCD, must be very widespread.

Many ABF Board members have indicated that they believe that we should put a moratorium on imports out of an abundance of caution and a wish to avoid any additional pests or pathogens that may be out there, without regard to the IAPV/CCD/Australian connection. But again, until we can prove that what risk factors and agents of harm we do and don't have in this country (requiring a National Pest and Pathogen Survey), then we may spend a great deal of time and energy on an objective that may be difficult or impossible to implement in view of our current treaty obligations. We need to conduct the pest and pathogen survey quickly (we've called upon USDA to complete one by October 1, 2007) and then take appropriate action.

Moving on to a review of the data in the paper, not all CCD colonies had IAPV – only 25 out of 30 (83%). Second, one healthy sample had IAPV. So the correlation between IAPV and CCD is not perfect. By comparison, *Nosema ceranae* was present in all (100%) CCD samples, but also in 17 (81%) healthy samples. Likewise, Kashmir Bee Virus (KBV) was found in all CCD samples (100%), and in 76% of healthy bees (16/21). Therefore KBV and *N. ceranae* are the most sensitive indicators of CCD – looking for KBV and *N. ceranae*

infections identifies all CCD samples without missing any. The most specific indicator of CCD was all 4 organisms together in one sample (IAPV, KBV, *N. apis* and *N. ceranae*), as none of the healthy samples was positive for all 4 organisms. IAPV did have the best “positive predictive value” – a positive result for IAPV infection was better correlated with CCD status than other single agent (25/26 IAPV positive samples were CCD). However, this is far from proving that IAPV causes CCD. And this positive correlation may diminish once more healthy colonies are sampled, especially some of the healthy colonies established over the past years from Australian bees.

Importantly, the figures discussed above were detections of the incidence of those organisms by sequencing, and as such they are likely to be extremely sensitive and report *Nosema* and viral infections that may be difficult to detect using other methods, like spore counts or qRT-PCR copy number. As such these figures say nothing about the abundance of those viruses and *Nosema* in the various samples, though the authors do report some average spore counts and viral copy numbers in the supplementary materials. Recall that one of the hallmarks of CCD is that only a handful of mostly young, newly emerged bees remain in CCD colonies. Please also recall that *Nosema* often occurs in colonies that do not exhibit any symptomology, albeit usually with only low or moderate spore counts. Yet young bees rarely have high spore counts even when the colony is collapsing from *Nosema* and most

of the older bees are dead. It will be interesting to more closely evaluate the abundance of Nosema spores in CCD and non-CCD samples. If Nosema spore counts are high even in the handful of young bees left behind in CCD colonies, then it could be that Nosema is the primary pathogen, and that IAPV merely emerges in colonies whose social structure and immune response have been impaired by that earlier infection.

The authors on the paper speculate that Varroa mites may make IAPV virulent in the US, and suggest that may be why Australia doesn't have any problem with CCD or IAPV. But this ignores that Varroa mites are in Canada and other countries where Australian bees have imported for years and where no CCD or IAPV problems have been reported. In Israel, where IAPV was first characterized, IAPV causes shivering, shaking, paralyzed bees, and dead bees are found on the ground in front of the hives – clearly this is unlike CCD here in the US.

In sum, while helpfully providing the first clues to patterns of organismal incidence that characterize CCD, the Science study poses as many questions as it answers. We will get to the bottom of CCD and IAPV, assuming we can persuade Congress to fund additional sample collection and analysis and the other studies that are currently planned. Those investigations would include inoculating healthy hives with IAPV, then observing their response and any ensuing pathology or collapse. Right now, there is no reason to believe that cutting off Australian imports at this juncture will do

anything to help solve the CCD crisis, and we don't have the necessary samples collected or analyzed to support such a move in any event.